PCT WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 5 : H04M 7/00 — A1

(11) International Publication Number: WO 95/01691

(43) International Publication Date: 12 January 1995 (12.01.95)

(21) International Application Number: PCT/US94/06608

(22) International Filing Date: 22 June 1994 (22.06.94)

(30) Priority Data:
08/086,956 2 July 1993 (02.07.93) US

(71) Applicant: AT & T CORP. [US/US]; 32 Avenue of the Americas, New York, NY 10013-2412 (US).

(72) Inventor: PARTRIDGE, B., Waring, III; 900 Holland Road, Far Hills, NJ 07931 (US).

(74) Agents: ROSENTHAL, E., J. et al.; P.O. Box 679, Holmdel, NJ 07733-0679 (US).

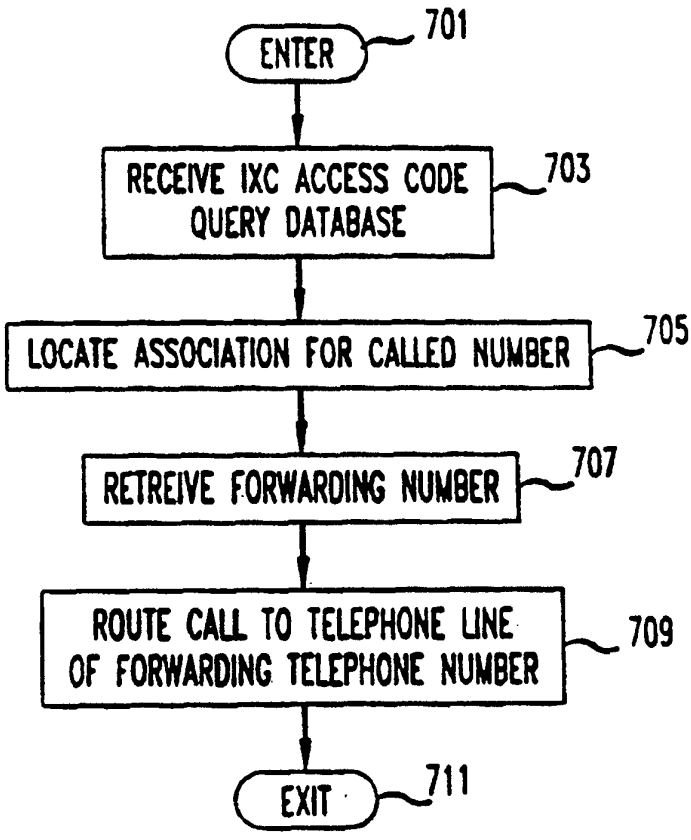
(81) Designated States: AU, CA, CN, JP, KR, NZ, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.

(54) Title: TELECOMMUNICATIONS FOLLOW ME SERVICES

(57) Abstract

An interexchange carrier (IXC) provides different treatment for calls on which it receives an indication that the caller dialed its access code. Calls placed without dialing the access code of the IXC are completed as in the prior art. One such treatment permits a subscriber to supply an IXC with an associated telephone number to which calls to the subscriber's telephone number should be directed when the caller dials the IXC's access code. A call is originated at a telephone (701). The IXC switch recognizes that its access code was dialed and queries its association data base using the called number (703). The association for the called subscriber is located, if there is one (705), enabling retrieval of the stored forwarding telephone number (707). The call is routed to the telephone line indicated by the forwarding telephone number (709) and the process then exits in step 711.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	**GB**	United Kingdom	**MR**	Mauritania
AU	Australia	**GE**	Georgia	**MW**	Malawi
BB	Barbados	**GN**	Guinea	**NE**	Niger
BE	Belgium	**GR**	Greece	**NL**	Netherlands
BF	Burkina Faso	**HU**	Hungary	**NO**	Norway
BG	Bulgaria	**IE**	Ireland	**NZ**	New Zealand
BJ	Benin	**IT**	Italy	**PL**	Poland
BR	Brazil	**JP**	Japan	**PT**	Portugal
BY	Belarus	**KE**	Kenya	**RO**	Romania
CA	Canada	**KG**	Kyrgystan	**RU**	Russian Federation
CF	Central African Republic	**KP**	Democratic People's Republic of Korea	**SD**	Sudan
CG	Congo			**SE**	Sweden
CH	Switzerland	**KR**	Republic of Korea	**SI**	Slovenia
CI	Côte d'Ivoire	**KZ**	Kazakhstan	**SK**	Slovakia
CM	Cameroon	**LI**	Liechtenstein	**SN**	Senegal
CN	China	**LK**	Sri Lanka	**TD**	Chad
CS	Czechoslovakia	**LU**	Luxembourg	**TG**	Togo
CZ	Czech Republic	**LV**	Latvia	**TJ**	Tajikistan
DE	Germany	**MC**	Monaco	**TT**	Trinidad and Tobago
DK	Denmark	**MD**	Republic of Moldova	**UA**	Ukraine
ES	Spain	**MG**	Madagascar	**US**	United States of America
FI	Finland	**ML**	Mali	**UZ**	Uzbekistan
FR	France	**MN**	Mongolia	**VN**	Viet Nam
GA	Gabon				

TELECOMMUNICATIONS FOLLOW ME SERVICES

Technical Field

This invention relates to the processing of telephone calls that are carried by more than one telephone service provider, and more particularly, to processing telephone calls when the carrier other than the initial service provider that carries a particular call may be selected either directly by the caller entering selection information on a per call basis or by "default", i.e., without the caller entering any information on a per call basis.

Background of the Invention

In the United States, telephone service is provided by multiple providers or carriers. Some calls are handled by one service provider, e.g., a local call completed between two wired telephone stations. Other calls, e.g., long-distance calls, require multiple service providers to cooperate for their completion.

The initial carrier providing telephone service is a local service provider, illustratively a local exchange carrier (LEC), such as New Jersey Bell, but also including cellular (wireless), cable and any so-called "dial-tone provider" or "first contact service provider", all such being referred to herein as local service providers. The second carrier is typically, but not necessarily, a long-distance--or so-called interexchange--telephone carrier. For example, presently, for a long-distance telephone call between wired telephone subscribers, the local service providers serving the calling and called telephones are LECs which are interconnected by a long-distance, or interexchange, carrier (IXC). In the United States, AT&T, MCI and Sprint are three such IXCs. In another example, for a local call from a mobile telephone to a wired telephone station, the local service provider is a cellular service provider while the second carrier could be a LEC that is connecting the network of the cellular service provider to a called party at the wired telephone station. Thus, it is possible for a telecommunications carrier to serve multiple roles, e.g., being the local service provider for some calls while being a second carrier for other calls.

Each telephone subscriber of a local service provider has associated with his telephone service a presubscribed default second carrier that was selected by or for the subscriber. The presubscribed default second carrier carries multiple-carrier calls originated from the subscriber's telephone unless the local service provider is instructed otherwise by way of the call-by-call entry of a telecommunications carrier code indicating which telecommunications carrier should carry the particular call. For any call for which a telecommunications carrier code is not entered, the default second carrier is typically identified based on the particular telephone link--

illustratively represented herein by a wired telephone line but also including wireless (cellular), fiber optic or cable connections and any other link provided to connect telephones to local service providers--on which the local service provider received the call.

Continuing with the above-described interexchange call example, which represents the most common scenario at present, each subscriber to local telephone service from a LEC has associated with his telephone line a "primary interexchange carrier," or PIC. The local subscriber is said to be "PIC'd" to the associated IXC. The interexchange carrier to which a subscriber is PIC'd will be used by default to complete interexchange calls originated from his telephone line unless the LEC is instructed otherwise. Such instruction is given when the subscriber enters, on a call-by-call basis, prior to dialing the called telephone number, a telecommunications carrier code, illustratively an IXC access code, corresponding to the desired IXC. One such IXC access code is "10 2 8 8" (1 0 A T T) corresponding to AT&T.

Specifically, when a long-distance call is initiated by the subscriber from his telephone line, and no access code is entered prior to the dialing of the called telephone number, the call is routed through the network of the originating subscriber's LEC, over the network of the PIC'd IXC and, ultimately, through the network of the LEC which has as one of its subscribers the terminating subscriber. Alternatively, a subscriber may initiate a long-distance call by dialing, prior to supplying the called telephone number, an IXC access code that indicates which of the IXCs he wishes to carry his call. Upon receipt of the access code by a switch of the LEC serving the caller, it is recognized that the caller wishes his call to be carried over the IXC corresponding to the received access code. Accordingly, the LEC routes the caller's call to a trunk connecting the LEC to the IXC indicated by the access code, regardless of the IXC to which the caller's telephone line is PIC'd. Thereafter, the LEC passes the called telephone number to the selected IXC. It is noted that the supplying of an IXC access code typically indicates the selection by the caller of an IXC other than the one that he is PIC'd to, but occasionally it may indicate the same IXC to which the caller is PIC'd.

According to prior art arrangements, the information indicating whether a call was routed to a particular telecommunications carrier because a telecommunications carrier code was supplied by the caller, as opposed to the caller having selected that particular telecommunications carrier by default, is never conveyed to the particular telecommunications carrier. Such information could prove useful and valuable to a telecommunications carrier, especially in the area of

providing special services. Therefore, in accordance with the principles described in concurrently filed United States Patent application Serial No. (case B.W. Partridge 2), if a telecommunications carrier code specifying a particular telecommunications carrier is supplied by a caller, the network of the local service provider routing such a call to the specified telecommunications carrier is arranged to transmit to the network of the selected telecommunications carrier an indication that a telecommunications carrier code was supplied by the caller to the local service provider. For example, the indication is transmitted as a signaling system 7 (SS7) message, or a portion thereof. Moreover, the local service provider may also provide an indication that the carrier whose telecommunications carrier code was entered is not the carrier that would have been selected by default for the calling telephone line.

Summary of the Invention

In accordance with the principles of the invention, a telecommunications carrier is arranged to provide different call treatment for a call, e.g., different call features or services, when the telecommunications carrier receives an indication that the telecommunications carrier's telecommunications carrier code was entered by the caller, as compared to the treatment the telecommunications carrier provides for the same call when such an indication is not received. According to one such service, the "follow me anywhere" service, if a caller placing a call to the subscriber's telephone prefixes the call with the telecommunications carrier code of the telecommunications carrier, the telecommunications carrier completes the call to the telephone corresponding to a telephone number previously specified by the subscriber. If the caller places the call without prefixing the call with the telecommunications carrier code of the telecommunications carrier, the call is completed to the subscriber's telephone. According to another such service, if a caller's call cannot be completed and the caller prefixed his call with the telecommunications carrier code of a telecommunications carrier, then the caller is supplied with a voice mailbox in which he can store a message that can later be retrieved by the called party. In one embodiment of the invention, the telecommunications carrier is an interexchange carrier and the telecommunications carrier code is an IXC access code.

Brief Description of the Drawing

In the drawing:

FIG. 1 shows an exemplary system for completing calls in accordance with the principles of the invention;

FIG. 2 shows an exemplary SS7 ISUP (ISDN User Part) IAM (Initial Address Message) where the indication that an IXC access code was dialed is conveyed as bit 1 of an IXC access parameter field;

FIG. 3 shows an exemplary "follow me anywhere" table in which is stored the information necessary to create an association between a subscriber's telephone number and a telephone number of a telephone line to which the subscriber wishes his calls to be routed to by the "follow me anywhere" service;

FIG. 4 shows an exemplary DN trigger table, for use in the system of FIG. 1, in which the telephone numbers of feature, or service, subscribers are listed in numerical order by area code and number;

FIG. 5 shows another embodiment of the invention, in which the information used with the "follow me anywhere" service is stored in a centralized data base within the network of an interexchange carrier (IXC);

FIG. 6 shows a flow chart of an exemplary process by which a subscriber stores the telephone number of a telephone line to which he wants calls placed to his telephone number to be routed in a data base, in accordance with the principles of the invention; and

FIG. 7 shows a flowchart of a process, in accordance with the principles of the invention, for using the "follow me anywhere" service so that a caller may make a call and have it forwarded to the called person when an association has been made in a data base within the network of a carrier as described in FIG. 6.

Detailed Description

The invention particularly relates to long-distance--or so-called interexchange--calls, which involve the use of the facilities of a long-distance, or interexchange, carrier, also referred to as an IXC. In the United States, for example, AT&T, MCI and Sprint are three such IXCs. Each subscriber to local telephone service from a local exchange carrier, or LEC, such as New Jersey Bell, has associated with his telephone line a "primary interexchange carrier," or PIC, that was selected by or for the local subscriber. The local subscriber is said to be "PIC'd" to the associated IXC.

When a subscriber initiates a long-distance call without entering any access code that identifies an IXC, the call is routed through the network of the originating subscriber's LEC, over the network of the PIC and, ultimately, through the network of the LEC which has as one of its subscribers the terminating subscriber. Similarly, if a subscriber initiates a long-distance call and prefixes the terminating telephone number by an access code that identifies an IXC, the call is

routed through the network of the originating subscriber's LEC, over the network of the IXC specified by the access code and, ultimately, through the network of the LEC which has as one of its subscribers the terminating subscriber. It is possible for some calls to be originated from a telephone line using the IXC access code that specifies the same IXC as the one to which the telephone line is PIC'd.

An IXC receiving a call from a LEC, according to the prior art, does not know if the call was routed to the IXC because the subscriber's telephone was PIC'd to that IXC or if the subscriber dialed an IXC access code to reach the IXC. If an access code specifying an IXC was entered by a caller, the network of the LEC routing such a call to the specified IXC is arranged to transmit to the network of the IXC an indication that an access code was entered. In accordance with the principles of the invention, the network of the IXC so accessed may then process such a call differently than if the call was routed to the IXC network because the subscriber's telephone line was PIC'd to the IXC.

In FIG. 1, a plurality of telephone subscribers 11...12 are provided with local exchange service by local exchange carrier (LEC) 20. LEC 20 includes a plurality of local central office switches 21...22 which serve respective ones of the subscribers. When a long-distance call is originated by one of the subscribers, say subscriber 11, the associated local switch 21 recognizes from the dialed telephone number--specifically the area code thereof--that this is, indeed, a long-distance call. As a part of the processing of this call, if no IXC access code is dialed, switch 21 accesses data base 26 in which is stored an identification of the primary interexchange carrier, or PIC, for each of the LEC's subscribers, as in the prior art. Inasmuch as data base 26 has PIC information relating to all the interexchange carriers, or IXCs, to which it has access, the data base is referred to herein as the "global" PIC data base.

In this example, subscriber 11 is PIC'd to IXC 30. That is, IXC 30 is that subscriber's selected primary interexchange carrier. IXC 30 includes a network of interexchange carrier switches which are illustratively AT&T 4ESS™ switches. The call is routed by local switch 21 to IXC 30 over link 27 and, more particularly, to originating switch 301 therein. In one embodiment of the invention link 27 contains all that is necessary to achieve a voice connection and a signaling connection between local switch 21 and originating switch 301. Within the network of IXC 30, the call is ultimately routed to IXC terminating switch 302. In being carried over the network, the call may have also been directed, for example, across various trunks and through various switching nodes (not shown), as is well known in

the art.

If an IXC access code is dialed, e.g., the access code for IXC 30, local switch 21 of LEC 20 routes the call to IXC switch 301, as before. However, in addition to any communications between local switch 21 and IXC switch 301 that were required by the prior art, local switch 21 also transmits to IXC switch 301, an indication that the IXC access code for IXC 30 was dialed. In one embodiment of the invention, the indication is transmitted as a signaling system 7 (SS7) message. FIG. 2 shows an exemplary SS7 ISUP (ISDN User Part) IAM (Initial Address Message) 201 where the indication that an IXC access code was dialed is conveyed as bit 1 in IXC access parameter field 203. It is noted that the IXC access parameter is not a parameter that is presently defined as part of the SS7 message set.

In a further embodiment of the invention, local switch 21 also transmits an indication that IXC 30 was not the IXC to which the telephone line of subscriber 11 was PIC'd if such is the case. Local switch 21 can determine this information by comparing the carrier corresponding to the dialed IXC access code against the IXC stored in global PIC database 26 for the telephone line of subscriber 11. Such an indication is embodied in bit 2 of IXC access parameter field 203 of SS7 ISUP (ISDN User Part) IAM (Initial Address Message) 201 shown in FIG. 2. If the bit is set to a 0, as shown, this indicates that the IXC carrying the call was not the IXC to which the telephone line of the subscriber originating the call was PIC'd. If the bit is set to a 1, this indicates that the IXC carrying the call was the IXC to which the telephone line of the subscriber originating the call was PIC'd. Field 205 is the length indicator for IXC access parameter field 203. The remaining bits of access parameter field 203 are each marked with an x to indicate that their values are not considered and that they are reserved for future use.

Those skilled in the art will know how to develop an indication for embodiments of the invention using multi-frequency (MF) signaling, which is the signaling employed by an older interface used to connect a LEC to an IXC when there is no SS7 connection between them. In either embodiment, the indicators may be transmitted from originating IXC switch 301 to terminating IXC switch 302 over IXC signaling network (SN) 390 as SS7 messages.

Also shown in FIG. 1 is LEC 40 which has as one of its subscribers the subscriber to which the call in question is being directed. Similar to LEC 20, LEC 40 includes local switches 41...42 which serve respective LEC subscribers 51...52, as well as a global PIC data base 46, which is used when outgoing long distance calls are made by subscribers 51...52. In this example, the terminating subscriber is

subscriber 51.

IXC switches 301 and 302 are interfaced to respective ones of common platform adjuncts (CPAs) 381...382. CPAs are processors designed to supplement the functionality available with already existing IXC switches so that together they can provide features and services that such switches could not otherwise provide without significant redesign. One such service, the "follow me anywhere" service, permits, in accordance with the principles of the invention, a subscriber to supply an IXC with the telephone number of a telephone line to which calls to the subscriber's telephone line should be directed if the caller placing a call to the subscriber's telephone line prefixes the call with the access code of the IXC. It is noted that new switches could be designed to have the functionality of a common platform adjunct built in.

CPA 382, an exemplary CPA, contains processor 388, which controls the operation of the CPA, connected to dual tone multi-frequency (DTMF) detector 384, data base 386 and interface 392. Interface 392 includes terminations for both voice channels and a signaling channel that pass between CPA 382 and IXC switch 372. In one embodiment, the connection between CPA 382 and IXC switch 372 is an Integrated Services Digital Network (ISDN) Primary Rate Interface (PRI) which provides 23 voice (B) channels and one data (D) channel associated with the voice channels. Optionally, interface 392 can supply alerts, e.g., tones or voice messages, over the voice channels. Interface 392 is connected to dual tone multi-frequency (DTMF) detector 384. Dual tone multi-frequency (DTMF) detector 384 can detect and transmit to processor 388 a decoded value for dual tone multi-frequency signals received on the channel terminated at interface 392. Interface 392 communicates messages between IXC switch 382 and CPA 382 to and from processor 388.

FIG. 3 shows exemplary "follow me anywhere" table 351 in which is stored the information necessary to create an association between a subscriber's telephone number, stored in subscriber telephone number field 353, and a telephone number of a telephone line to which the subscriber wishes his calls to be routed by the "follow me anywhere" service, stored in forwarding telephone number field 355. A personal identification number (PIN) may be stored for each subscriber in PIN field 357 to be used in verifying his authority to change the telephone number stored in forwarding telephone number field 355. If a subscriber's telephone number is not found listed in field 353, then he has not subscribed to the "follow me anywhere" service, although there may be other services provided by CPA 382 to which he has subscribed.

Each IXC switch has, for use when it is a terminating switch, a respective one of destination number (DN) trigger tables 371..372 in which are listed the telephone numbers of subscribers who subscribe to features or services that require a common platform adjunct (CPA) to provide at least some functionality for their implementation. FIG. 4 shows an exemplary DN trigger table in which the telephone numbers 341, coloquially also known as the automatic number identification (ANI), of feature or service subscribers are listed in numerical order by area code and number. XXX-XXXX is a representation indicating the last number stored for any particular area code. It is noted that presubscription is not necessary if all calls terminated by IXC switch 372 are routed to CPA 382 and if any subscriber is permitted to store a telephone number in forwarding telephone number field 355.

For the call placed from subscriber 11 to subscriber 51, IXC terminating switch 302 tests to determine if the telephone number of subscriber 51 is listed in its DN trigger table. If the terminating subscriber number is not listed, IXC terminating switch 302 routes the call to local switch 41 which, in turn, passes the call to the telephone line of its terminating subscriber 51 whether or not an IXC access code was dialed. A connection between subscribers 11 and 51 is thus made, the connection including both LECs and the IXC, as is typical in the prior art.

However, if the terminating subscriber number is listed in DN trigger table 372 of IXC terminating switch 302, then IXC terminating switch 302 queries CPA 382 by sending it 1) the so-called calling party number (CPN), i.e., the telephone number (ANI) of the terminating subscriber, and 2) an indication that the call was placed using an IXC access code, if the switch received such an indication. CPA 382 looks up the features and services that it is to provide for the terminating party number. If "follow me anywhere" service is to be provided, as indicated by an entry for the terminating party number in subscriber's telephone line field 353 of "follow me anywhere" association table 351 (FIG. 3), CPA 382 determines 1) if the call was placed using an IXC access code and 2) if, for the called subscriber, the telephone number of a telephone line other than his telephone line has been stored. If neither or only one of the conditions are met, the call is completed to the subscriber's line, as is typical in the prior art. However, if both conditions are met, CPA 382 provides to IXC terminating switch 302 with the associated telephone number stored in forwarding telephone number field 355, in accordance with an aspect of the invention. IXC terminating switch 302 then causes the call to be routed through the IXC network to an IXC switch connected to the LEC serving the telephone line indicated by the stored telephone number. CPA 382 also informs IXC

terminating switch 302 that it should begin billing the telephone account of the called subscriber for the cost of the additional portion of the call necessitated by the use of the "follow me anywhere" service. The manner in which the telephone number is stored in forwarding telephone number field 355 for use with the "follow me anywhere" service will be described further below.

FIG. 5 shows another embodiment of the invention, in which the information used with the "follow me anywhere" service is stored in a centralized data base, e.g., a well known network control point (NCP) within the network of an interexchange carrier (IXC). Shown are a) telephone station 501, from which calls may be originated, b) local exchange carrier (LEC) 503, c) IXC switches 505, 533 and 535, with IXC switch 505 being shown in greater detail, d) CCS network 523 and e) data base 531.

IXC switch 505 includes: a) main processor 507, b) announcement facility (ANN FAC) 509, c) dual tone multi-frequency receiver (DTMF REC) 511, d) message interface 515, e) bus 517, f) switch fabric 518 and g) voice recognition unit 516. Main processor 507 controls the overall operation of IXC switch 505 by performing any necessary processing and exchanging messages with the other components of IXC switch 505 over bus 517. Announcement facility (ANN FAC) 509 can present various announcements which can be heard by the calling party. The announcements, or combinative portions thereof, are prestored in announcement facility (ANN FAC) 509 and accessed by supplying announcement facility (ANN FAC) 509 with pointers to the announcements. Dual tone multi-frequency receiver (DTMF REC) 511 receives dual tone multi-frequency signals that are transmitted in response to the pressing of keys on the keypad of telephone station 501 and supplies the digit corresponding to each pressed key to main processor 507.

Message interface 515 is a protocol conversion unit that permits IXC switch 505 to communicate with a common channel signaling (CCS) network, such as CCS network 523. It is responsible for formatting all messages transmitted to CCS network 523 and for extracting responses received from CCS network 523. Other IXC switches, such as IXC switches 533 and 535, may also route messages via CCS network 523 to data base 531.

Switch fabric 518 can connect the trunk on which the calling party's call arrived at IXC switch 505, e.g., trunk 504, to a) announcement facility (ANN FAC) 509 b) dual tone multi-frequency receiver (DTMF REC) 511, c) voice recognition unit 516 or d) to the rest of the interexchange carrier's network, via link 521. The purposes of such connections are described further below.

Given the description above, IXC switch 505 can be designed by those skilled in the art to receive a message indicating that an IXC carrier code was entered and, if so, to provide the "follow me anywhere" service.

FIG. 6 shows a flow chart of an exemplary process by which a subscriber stores the telephone number of a telephone line to which he wants calls placed to his telephone number to be routed in a data base, e.g. data base 386 (FIG. 1) or data base 531 (FIG. 5), in accordance with the principles of the invention. The process will be described in terms of the apparatus shown in FIG. 5, although the same steps are applicable to the apparatus shown in FIG. 1. Therefore, from the description of the process hereinbelow, those skilled in the art will know how to apply the method to the apparatus shown in FIG. 1.

The process is entered in step 601 (FIG. 6) when IXC switch 501 receives an indication that a telephone number for "follow me anywhere" service is to be stored. Such an indication may be a call to a particular predetermined telephone number. For example, a caller at telephone station 501 (FIG. 5) may signal that he wishes to establish an association by placing a call to an 800-type number specified by the interexchange carrier.

LEC 503 recognizes from the particular 800-type number dialed by the caller that the call is to be carried by a particular IXC and, therefore, it forwards the call to IXC switch 505 of that IXC. IXC switch 505 recognizes that the particular 800-type number that was dialed is one that must be forwarded to and processed by data base 531. Therefore, it transmits a message containing the dialed number to data base 531. The message is sent via message interface 515 and CCS network 523. Data base 531 recognizes that the dialed number is the telephone number indicating that a new telephone number for the "follow me anywhere" service is to be stored and it, therefore, begins a session to obtain and store the necessary information.

Next, in step 603 (FIG. 6), the caller is prompted to enter the telephone number of his telephone line. All prompting is performed by IXC switch 505 (FIG. 5) causing announcement facility (ANN FAC) 509 to play appropriate announcements to the caller. The particular prompt supplied at any point in the process, unless otherwise specified, is the one indicated in a message received from data base 531. Switch fabric 518 connects the caller's call on trunk 504 to announcement facility (ANN FAC) 509 so that the caller may hear the prompts.

By pressing keys at telephone station 501, the caller supplies his responses to the prompts in the form of dual tone multi-frequency (DTMF) signals. To receive and decode the dual tone multi-frequency (DTMF) signals supplied by

the caller, dual tone multi-frequency receiver (DTMF REC) 511 is connected to the caller's call, via switch fabric 518. Messages corresponding to the decoded received signals are transmitted to data base 531 via message interface 515 and CCS network 523. In an alternative embodiment, the caller could supply his responses to the prompts in the form of speech which is received and decoded by voice recognition unit 516.

The information received from the caller is validated in step 605 (FIG. 6). This step is performed by determining if the telephone number supplied is one that is subscribed to the "follow me anywhere" service. Such a determination may be made by data base 531 (FIG. 5). Entry of a valid PIN may also be required of the subscriber before he is permitted to store a new telephone number for the "follow me anywhere" service. Next, in step 615, the caller is prompted to enter the telephone number of the telephone station to which calls placed to his telephone line should be routed, i.e., the forwarding number. In step 625, in accordance with the principles of the invention, data base 531 stores the received information so as to associate the subscriber's telephone line with the supplied forwarding telephone number. The process is then exited in step 627.

FIG. 7 shows a flowchart of a process, in accordance with the principles of the invention, for using the "follow me anywhere" service so that a caller may make a call and have it forwarded to the called person when an association has been made in a data base within the network of a carrier as described in FIG. 6. The process is entered in step 701 when a calling party originates a card call at a telephone station for which an association has been established, e.g., telephone station 501 (FIG. 5), by a) dialing 1 + area code + number or b) access code + 1 + area code + number. A switch of local exchange carrier (LEC) 503 receives the dialed digits and recognizes that the call is an IXC type of call. Therefore, local exchange carrier (LEC) 503 will route the call to an IXC switch for further handling.

If an access code for a specific interexchange carrier (IXC) is not specified as part of the digits dialed by the calling party, but yet the call must be carried by an interexchange carrier, local exchange carrier 503 routes the call over a trunk, e.g., trunk 504, to IXC switch 505 of an interexchange carrier. Local exchange carrier 503 is aware of a default interexchange carrier to which telephone station 501 has been assigned. If the dialed digits include an access code specifying a particular interexchange carrier, local exchange carrier 503 routes the call over a trunk to an IXC switch 505 of the specified interexchange carrier. Furthermore, local exchange carrier (LEC) 503 signals to IXC switch 505 that an access code was

dialed by the caller, if one was dialed.

In step 703 (FIG. 7), IXC switch recognizes the call as having been dialed using an IXC access code and, in accordance with an aspect of the invention, it queries data base 531 (FIG. 5) by sending it the called number. Data base 531 recognizes that the call is one that is a candidate for the "follow me anywhere" service, based on the called subscriber's number. Data base 531 locates the association for the received called subscriber number stored using the process shown in FIG. 6, if there is one, in step 705. Next, the stored forwarding telephone number of the telephone station is retrieved in step 707 by employing the association between the telephone number of the telephone line of the stored subscriber and the forwarding telephone number, in accordance with the principles of the invention. The call is routed to the telephone line indicated by the forwarding telephone number in step 709 and the process then exits in step 711. It is noted that only calls 1) placed over a carrier in which was previously stored an association between the telephone line of the called party and another telephone line and 2) for which an access code was dialed, can use the "follow me anywhere" service.

It is noted that in the discussion of FIG. 1 it was mentioned that the called party would pay for any additional charges that resulted because of the forwarding. However, there is no reason that the calling party could not be made to pay for the entire cost of a call even if it were forwarded to a different telephone line than the calling party expected to reach. This would be achieved by substituting the forwarding number for the dialed number in the billing record of the call.

In other embodiments of the invention, the indication that an IXC access code was entered can be used to trigger services other than the above-described "follow me anywhere" service. For example, a discount may be offered to all callers who use an IXC access code in placing their IXC calls.

Additionally, call information other than the called telephone number may be used, along with the indication that an IXC access code was entered, to trigger such other services. For example, if a call was dialed from a non-pay telephone that was PIC'd to an IXC other than the one selected by dialing its IXC access code, a particular greeting or thank you message may be supplied to the caller. Alternatively, a discount may be given by an IXC to only those callers who enter its access code and are PIC'd to that IXC, so as to provide a benefit for loyal subscribers who pay attention to its advertising. Similarly, a discount may be given by an IXC to only those callers who enter its access code and are not PIC'd to that IXC, so as to entice new users to try its service.

It may also be useful to an IXC to tally the number of telephone calls that are placed through its network using its access code. Doing so will give the IXC information concerning the effectiveness of its advertising. This information may be further broken down by the categories of the calls, or characteristics of the calls, such as, pay telephone calls, non-pay telephone calls, residential telephone calls, and business telephone calls, as well as times of calling.

In order to facilitate use of the IXC access code, it may be preprogrammed into a programmable one-touch-dialing button on the subscriber's telephone, if such buttons are available. Similarly a pay telephone can be provided with preprogrammed buttons one-touch-dialing that correspond to the access codes of various IXCs and are labeled with the names of the IXC's. A caller at such a phone simply need press the IXC's button prior to dialing the called party's number to be sure that his calls are placed over his desired IXC. The pay phone responds to the pressing of the selected IXC by dialing the access code for the selected IXC. Thereafter, the caller dials the call as in the prior art.

It is emphasized that although the foregoing example was described in terms of IXC access codes having a form of "1-0-XXX", that the invention is not so limited and that any form of telecommunications carrier code will suffice. For example, the telecommunications carrier code may be in the form of speech, namely, the speaking of the name of the particular telecommunications carrier.

The foregoing merely illustrates the principles of the invention. It will thus be appreciated that those skilled in the art will be able to devise various arrangements which, although not explicitly described or shown herein, embody the principles of the invention and are thus within its spirit and scope.

Claims:

1. A method for use in a calling environment in which the telephones of calling and called parties are connected to networks of respective local service providers and the networks of said local service providers are connected for any particular multiple carrier call between a calling party and a called party by one of a plurality of networks respectively associated with one of a plurality of telecommunications carriers, and where for any multiple-carrier call a particular one of said telecommunications carriers to which the telephone of the calling party is presubscribed is selected by default to complete said call unless the calling party entered for that call a telecommunications carrier code specifying a particular telecommunications carrier to complete said call, said call being given a first call treatment if no indication that said calling party entered said telecommunications carrier's telecommunications carrier code is received, the method characterized by the step of:

receiving at a telecommunications carrier that was selected to complete a call, in response to a caller having entered a telecommunications carrier code corresponding to said telecommunications carrier, an indication that said caller entered said carrier's telecommunications carrier code; and

giving said call a second call treatment, different from said first call treatment, if said indication is received.

2. The invention as defined in claim 1 wherein said first call treatment is the routing of said call to the telephone of the called party, as indicated directly by the telephone number dialed by said calling party, and said second call treatment is the routing of said call to a telephone indicated by a telephone number stored in a data base in association with said telephone number dialed by said calling party.

3. The invention as defined in claim 2 further including the steps of :

receiving a telephone number supplied by said called party; and

storing said telephone number in said data base for use with said second call treatment.

4. The invention as defined in claim 1 characterized in that the calling party is not a subscriber to telecommunications services provided by the telecommunications carrier represented by the entered telecommunications carrier code.

5. Apparatus for use in the network of a telecommunications carrier, characterized by:

means for receiving information for completing a call from a caller, said information including an indication that said caller entered a telecommunications carriers code when originating said call; and

means responsive to said received indication for providing said call with a call treatment that is different from the call treatment of calls identical to said call but for which said telecommunications carrier code is not entered.

6. A method for use in a telephone network of a telecommunications carrier for processing a telephone call from a calling party, said telecommunications carrier having an associated telecommunications carrier code, the method characterized by the steps of:

storing a default call treatment in said telephone network of said telecommunications carrier for use when said telecommunications carrier code is not dialed by said calling party; and

overriding said default call treatment and processing said telephone call according to a second stored call treatment in said telephone network of said telecommunications carrier if said telecommunications carrier code is dialed by said calling party.

7. A method for use in a telephone network of a telecommunications carrier that has an associated telecommunications carrier code for processing a telephone call from a calling party, the method characterized by the step of:

selecting in said telephone network for said telephone call a particular call processing treatment from among a plurality of call processing treatments as a function of receipt of said telecommunications carrier code from said caller for said call.

8. Apparatus for use in completing a telephone call between a calling party and a called party through a telephone characterized by:

means for receiving a number dialed by the calling party, said number including specific information designating a particular telecommunications carrier to complete said call, and a telephone number of the telephone line of the called party; and

means for completing said telephone call to a telephone line other than said telephone line of the called party in response to receipt of the telecommunications carrier designating information and the telephone number of the telephone line of the called party and for completing said telephone call to the telephone line of the called party in response to the absence of said telecommunications carrier designating information.

FIG. 1

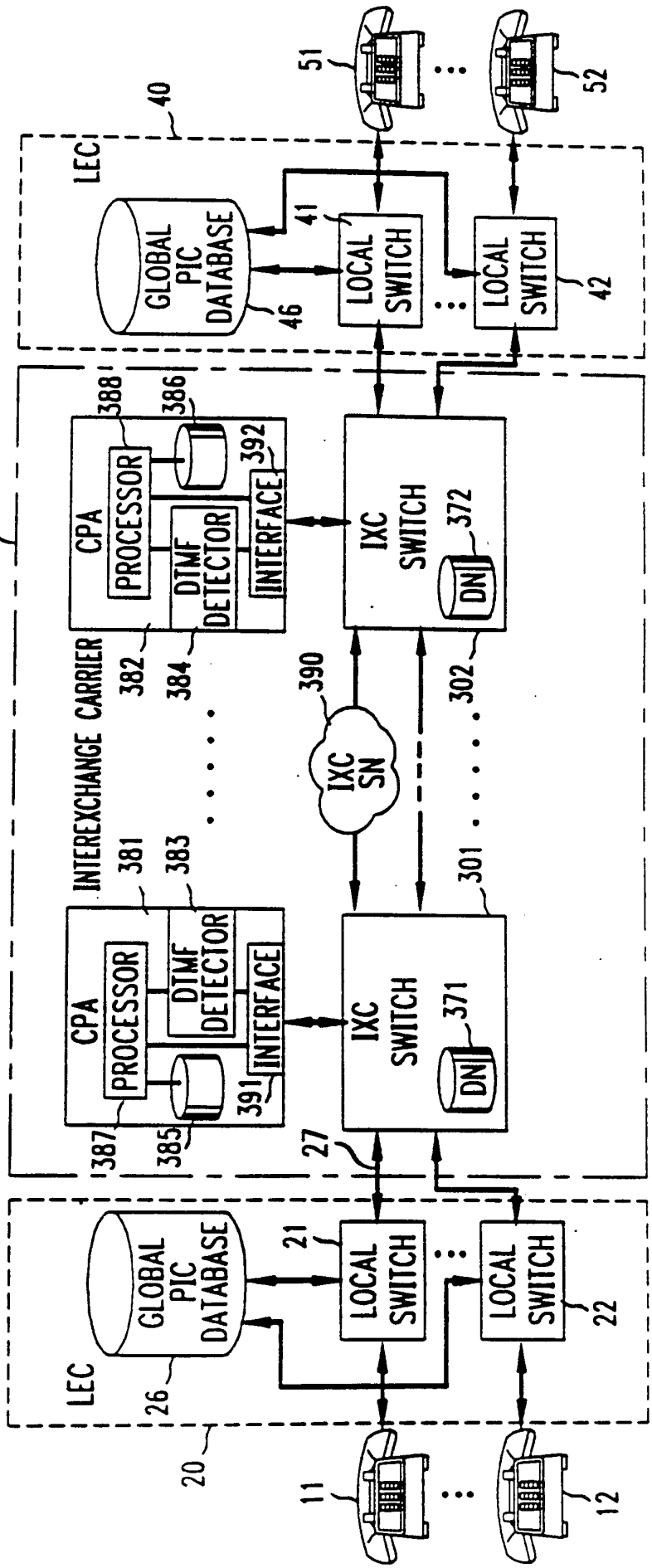

30
INTEREXCHANGE CARRIER
LEC
GLOBAL PIC DATABASE
LOCAL SWITCH
CPA
PROCESSOR
DTMF DETECTOR
INTERFACE
IXC SWITCH
DN
IXC SN
40
41
42
46
51
52
381
382
383
384
385
386
387
388
390
391
392
301
302
371
372
27
20
21
22
26
11
12

FIG. 2

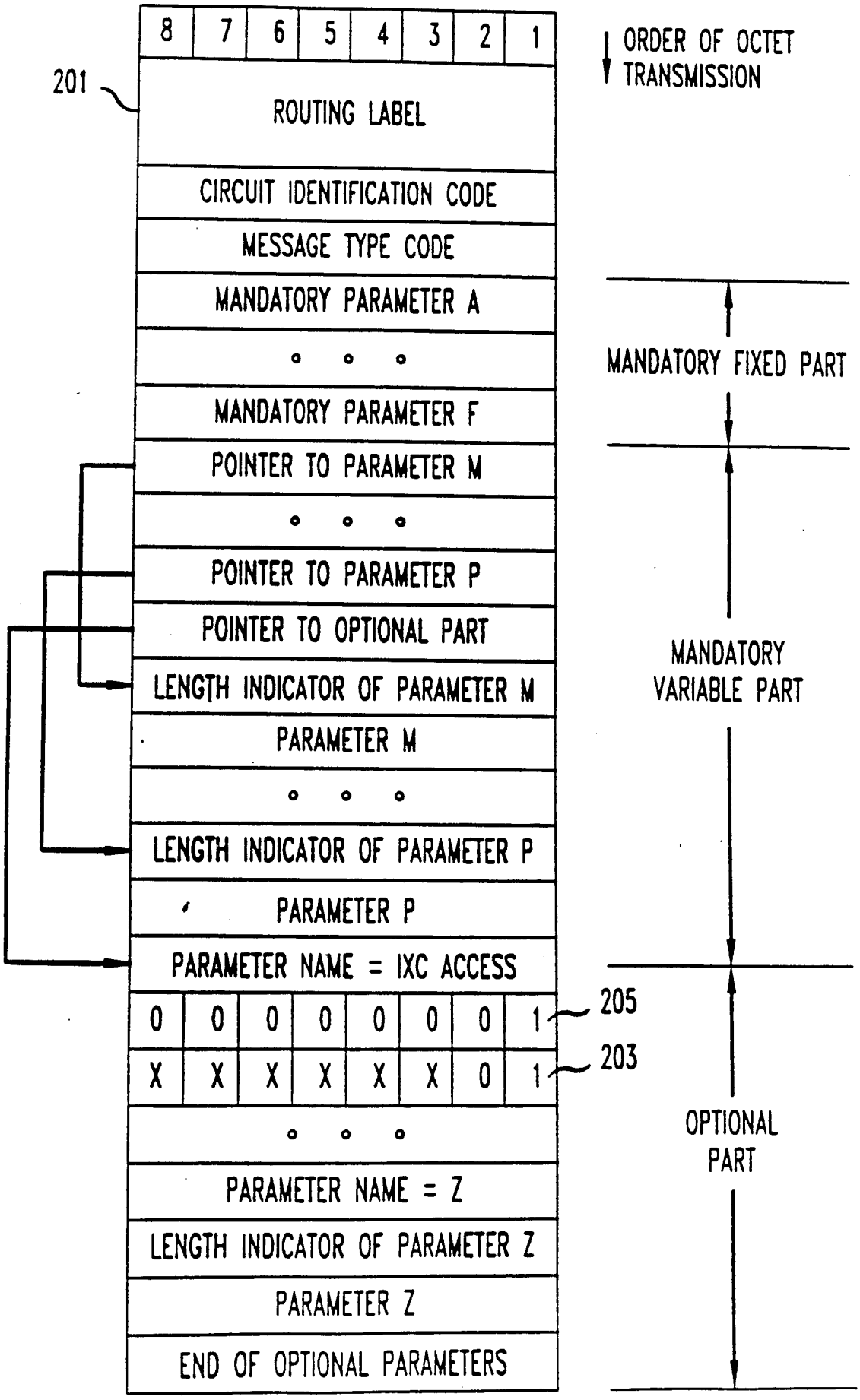

ORDER OF BIT TRANSMISSION
8 7 6 5 4 3 2 1
ORDER OF OCTET TRANSMISSION
201
ROUTING LABEL
CIRCUIT IDENTIFICATION CODE
MESSAGE TYPE CODE
MANDATORY PARAMETER A
MANDATORY PARAMETER F
POINTER TO PARAMETER M
POINTER TO PARAMETER P
POINTER TO OPTIONAL PART
LENGTH INDICATOR OF PARAMETER M
PARAMETER M
LENGTH INDICATOR OF PARAMETER P
PARAMETER P
PARAMETER NAME = IXC ACCESS
0 0 0 0 0 0 0 1
X X X X X X 0 1
205
203
PARAMETER NAME = Z
LENGTH INDICATOR OF PARAMETER Z
PARAMETER Z
END OF OPTIONAL PARAMETERS
MANDATORY FIXED PART
MANDATORY VARIABLE PART
OPTIONAL PART

FIG.3

353 SUBSCRIBER'S TELEPHONE LINE	351 FORWARDING TELEPHONE NUMBER	355	357 PIN
(201) 234-5678	(201) 234-5678		1234
(408) 345-6789	(212) 998-3844		5678
(408) 456-7891	(800) 555-9292		9876
(500) 123-4567	(500) 123-4567		5432
(908) 123-4567	(708) 707-9999		1013

FIG. 4

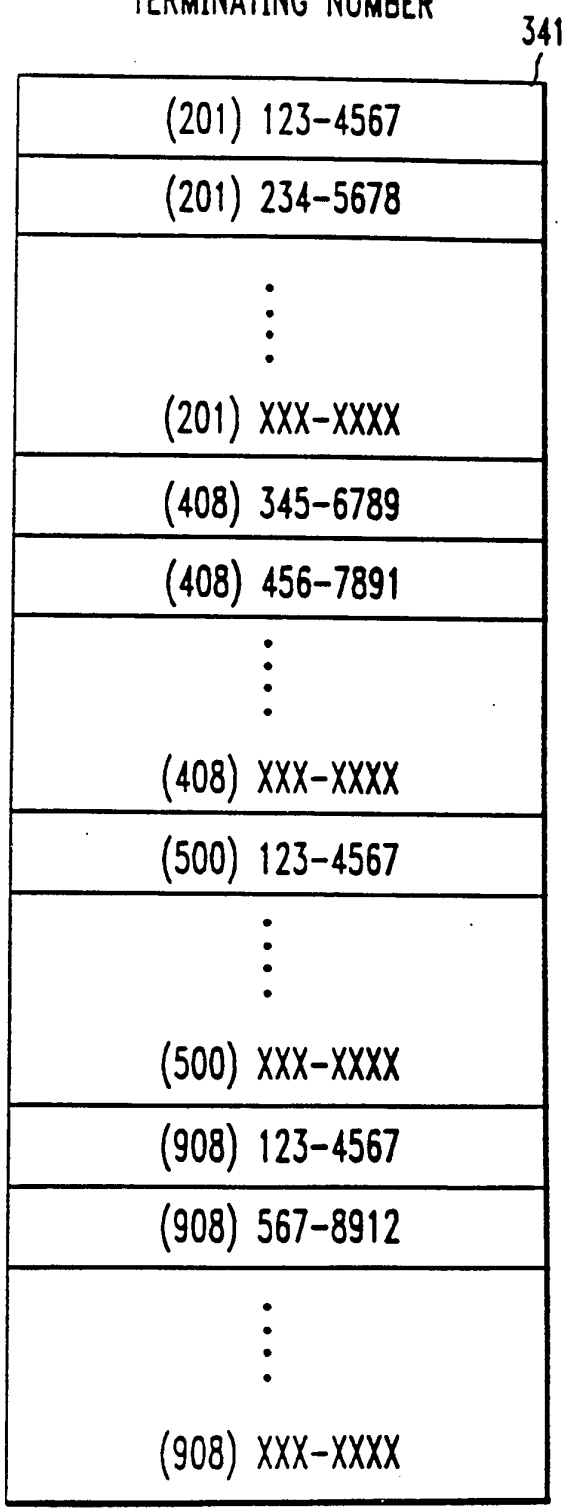

TERMINATING NUMBER
341
(201) 123-4567
(201) 234-5678
(201) XXX-XXXX
(408) 345-6789
(408) 456-7891
(408) XXX-XXXX
(500) 123-4567
(500) XXX-XXXX
(908) 123-4567
(908) 567-8912
(908) XXX-XXXX

FIG.5

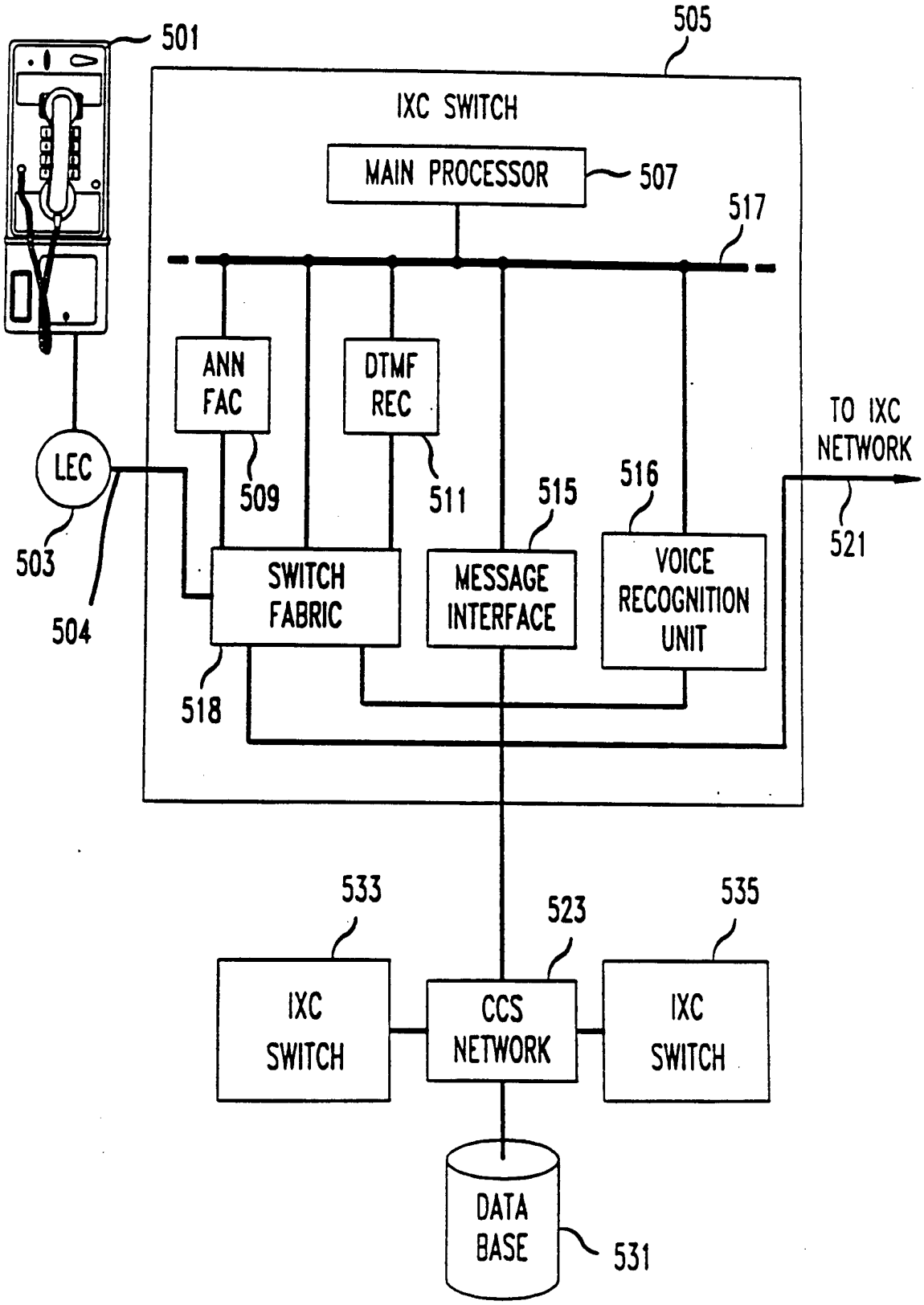

501
505
IXC SWITCH
MAIN PROCESSOR
507
517
ANN FAC
DTMF REC
TO IXC NETWORK
LEC
509
511
515
516
503
504
SWITCH FABRIC
MESSAGE INTERFACE
VOICE RECOGNITION UNIT
521
518
533
523
535
IXC SWITCH
CCS NETWORK
IXC SWITCH
DATA BASE
531

FIG. 6

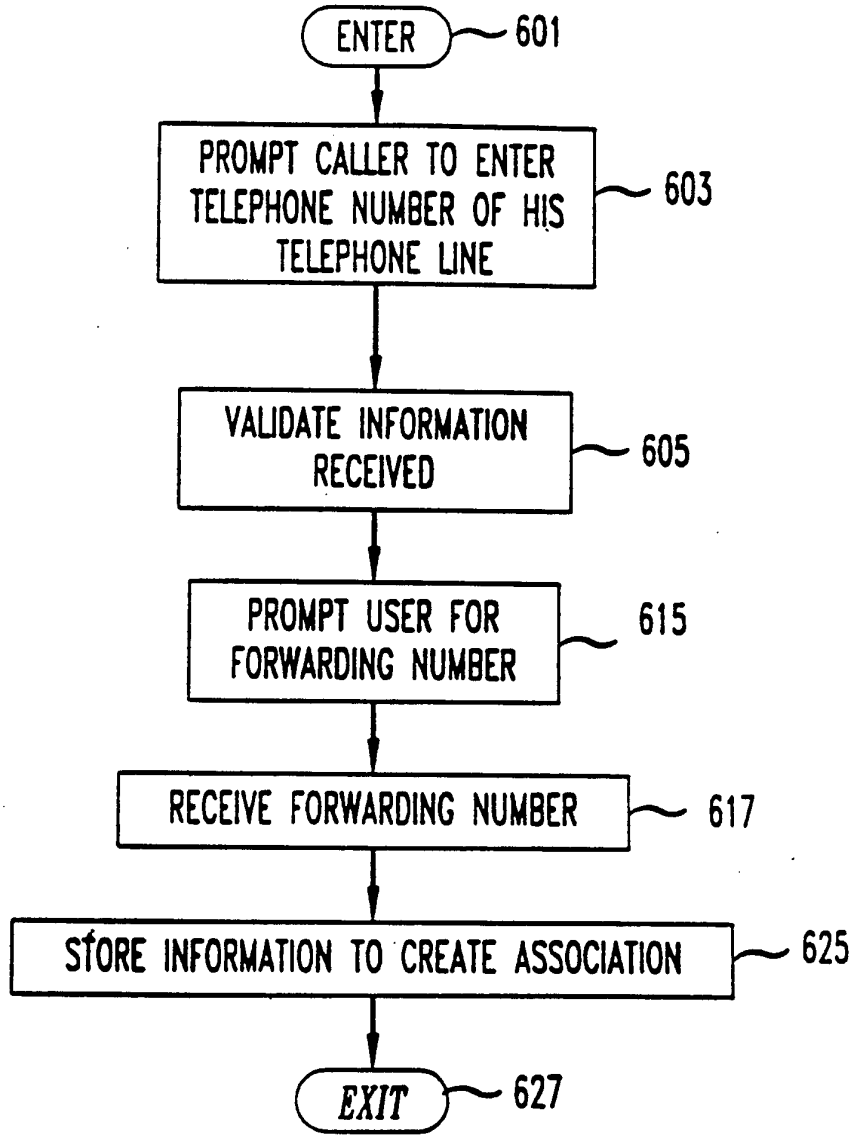
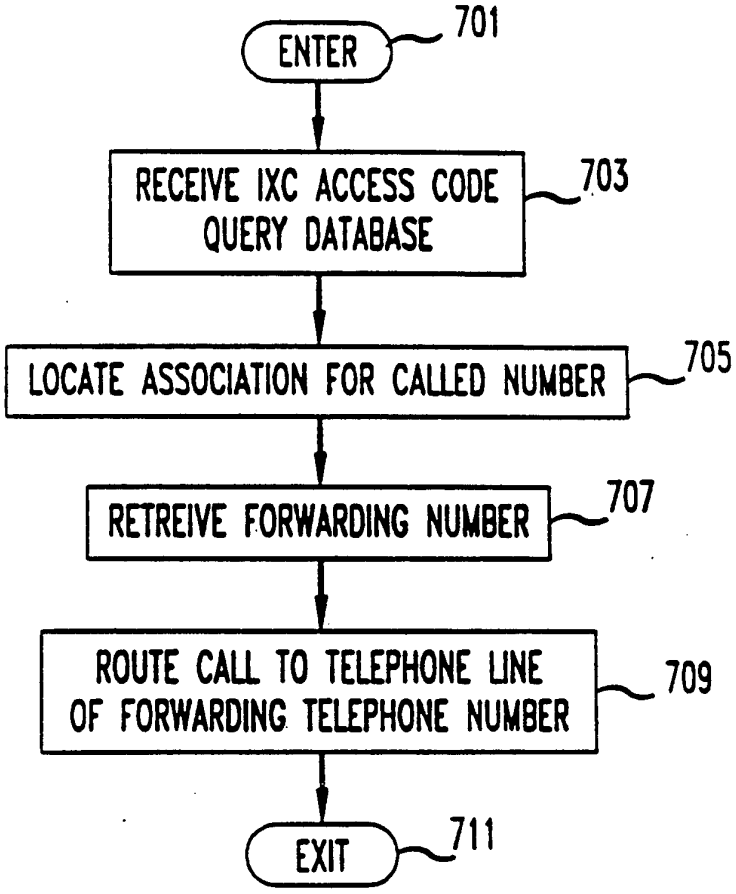

ENTER
601
PROMPT CALLER TO ENTER TELEPHONE NUMBER OF HIS TELEPHONE LINE
603
VALIDATE INFORMATION RECEIVED
605
PROMPT USER FOR FORWARDING NUMBER
615
RECEIVE FORWARDING NUMBER
617
STORE INFORMATION TO CREATE ASSOCIATION
625
EXIT
627

FIG. 7


ENTER
701
RECEIVE IXC ACCESS CODE
QUERY DATABASE
703
LOCATE ASSOCIATION FOR CALLED NUMBER
705
RETREIVE FORWARDING NUMBER
707
ROUTE CALL TO TELEPHONE LINE
OF FORWARDING TELEPHONE NUMBER
709
EXIT
711

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/06608

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :Please See Extra Sheet.
US CL : CLASS 379 SUBCLASSES 130,112,114,115,355,354,216,210,211,212,201
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : CLASS 379 SUBCLASSES 130,112,114,115,355,354,216,210,211,212,201

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 4,555,594 (FRIEDES ET AL.) 26 NOVEMBER 1985, ABSTRACT, FIGS. 1-12B, COL. 2 LINE 26 TO COL. 3 LINE 56.	1-8
Y	US, A, 4,313,035 (JORDAN ET AL.) 26 JANUARY 1982, ABSTRACT, COL. 2 LINE 65 TO COL. 3 LINE 63.	2, 8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be part of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search	Date of mailing of the international search report
29 AUGUST 1994	21 SEP 1994
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	Authorized officer MICHAEL LAU
Facsimile No. (703) 305-3230	Telephone No. (703) 305-4700

Form PCT/ISA/210 (second sheet)(July 1992)★

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US94/06608

A. CLASSIFICATION OF SUBJECT MATTER:
IPC (5):

H04M 7/00